

Saanen Cluster Analysis Summary September, 2014

Data was obtained from the ADGA for 8 dairy breeds. All results were limited to those animals reported as Purebred (PB) or American (AM); however, all animals were included in the pedigree analysis to establish ties between animals, including cases where the ancestors are from another breed. Cluster analysis is a procedure that groups related animals based on pedigree relationship. This is a technique used by NAGP to assess where repository animals are grouping with the currently available genetic pool for each breed. It also establishes a practical approach for obtaining animals for the repository in a way that maximizes genetic diversity. Animals that were included in the cluster analysis included sires of PB and AM offspring born 2010 to present that are also PB or AM themselves. Repository bucks are also included in the clusters.

Table 1 shows the summary statistics based on the pedigree and cluster analyses.

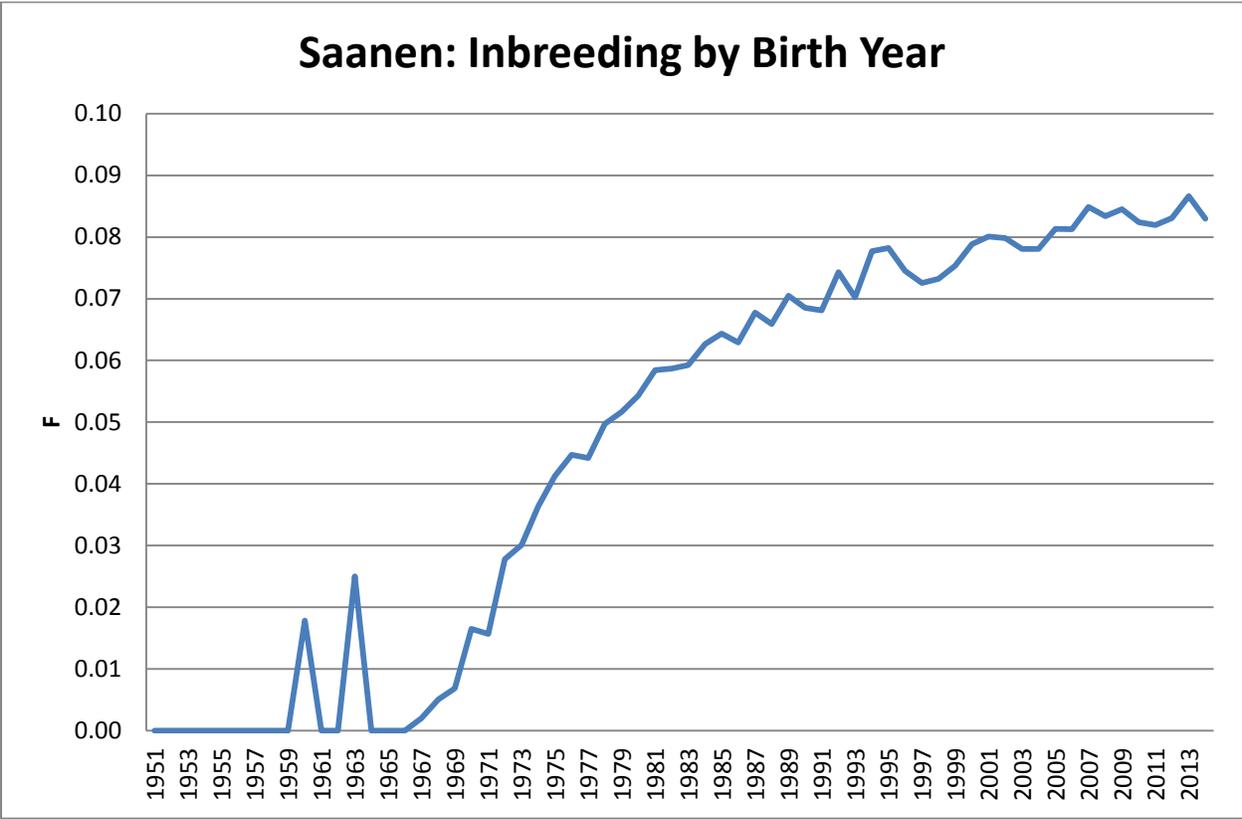
Table 1. Summary statistics for Saanen

	Saanen
Animals that are PB or AM	125,400
Full pedigree file (until all ancestors are unknown)	146,018
Unique sires	14,430
Unique dams	49,186
Mean inbreeding (F)	0.070
F range	0 - 0.62
Repository bucks	8
Clustered bucks	2,009

Pedigree & Inbreeding Analysis

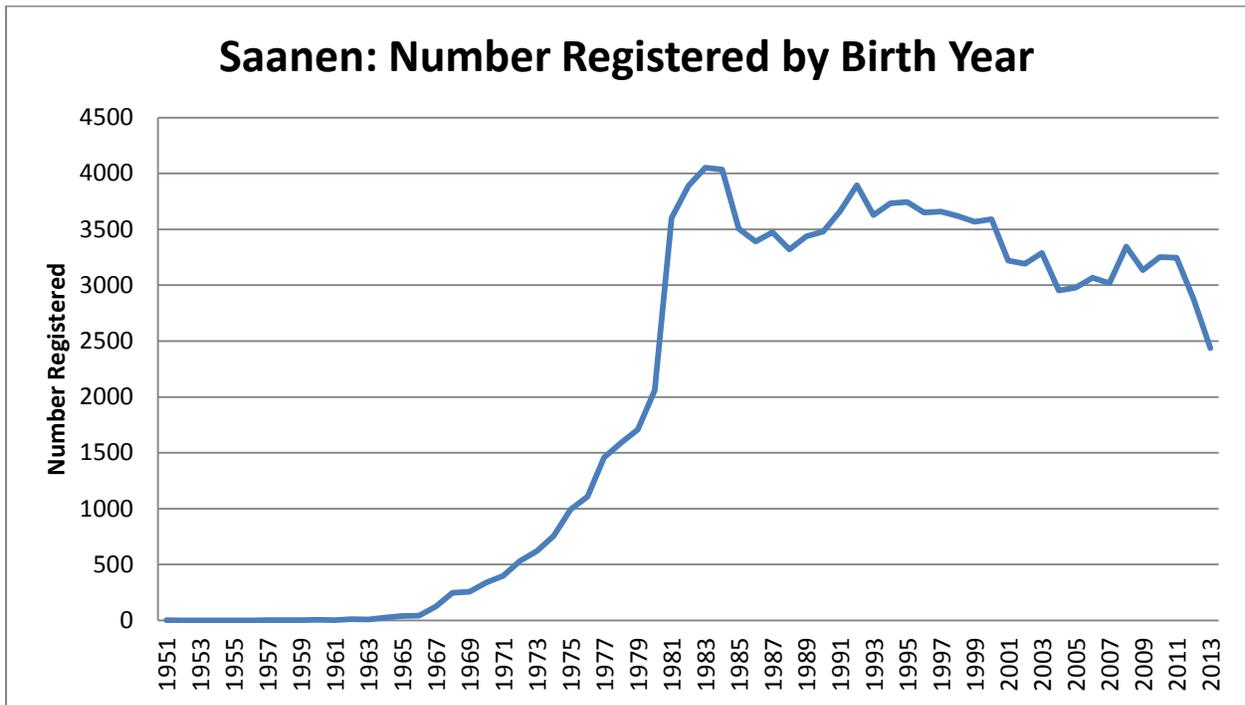
Saanen inbreeding levels have slowly and steadily increased over time, leading to the current level of 8.7% for goats born in 2013 (Figure 1).

Figure 1. Saanen inbreeding trend by birth year



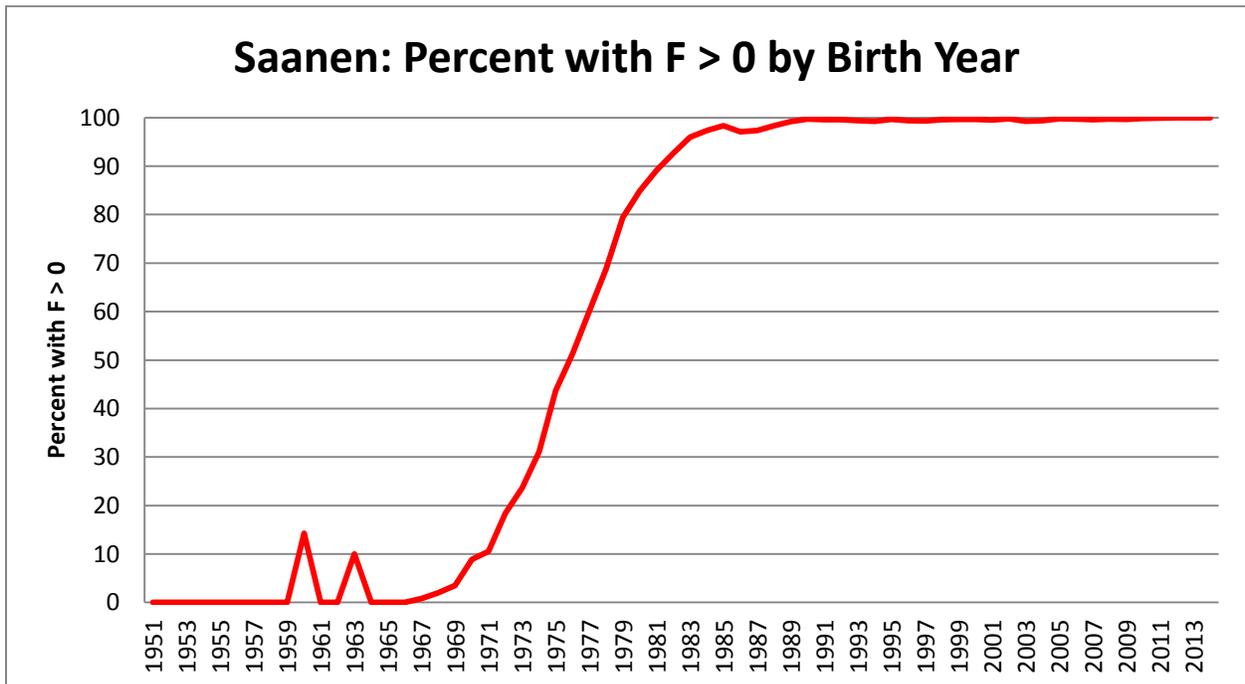
Number registered by birth year peaked in 1983 at 4,053. Current registrations are 2,437 for goats born in 2013 (Figure 2).

Figure 2. Saanen goats registered by birth year



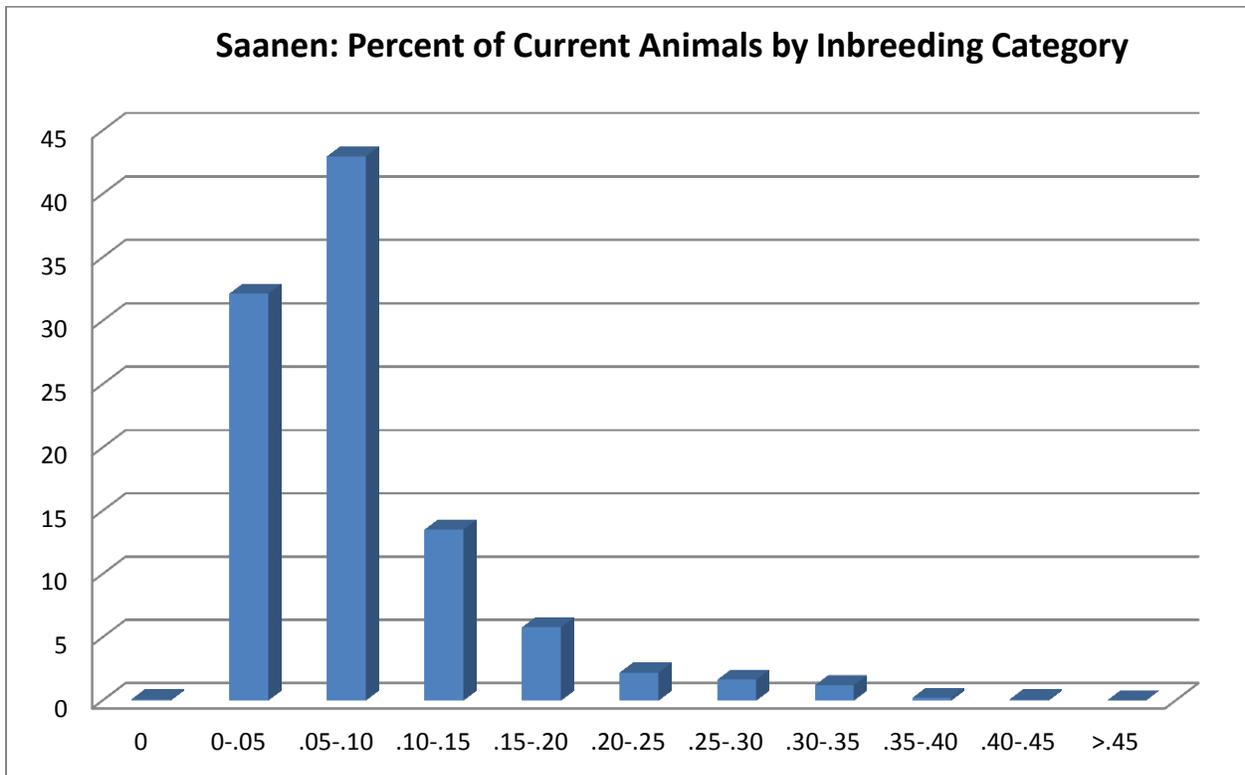
As depicted in Figure 3, almost all animals have had some level of inbreeding accumulation since 1989.

Figure 3. Percent of Saanens with an inbreeding coefficient greater than zero by birth year



For the current population (animals born 2009 and later), there are more than 75 percent with an inbreeding coefficient of 0.10 or less.

Figure 4. Percent of Saanens born 2009 and later by inbreeding category



The Saanen cluster analysis resulted in 18 clusters representing the various groups within the breed (Figure 5). The average relationship of the clustered bucks was 0.093. Only one cluster was below this relationship (cluster 2; 0.082) and that cluster includes 7 of the 8 repository bucks (Table 2).

Figure 5. Tree diagram for Saanen cluster analysis of sires of PB and AM offspring born 2010 and later that are PB or AM themselves (gold line depicts cluster level)

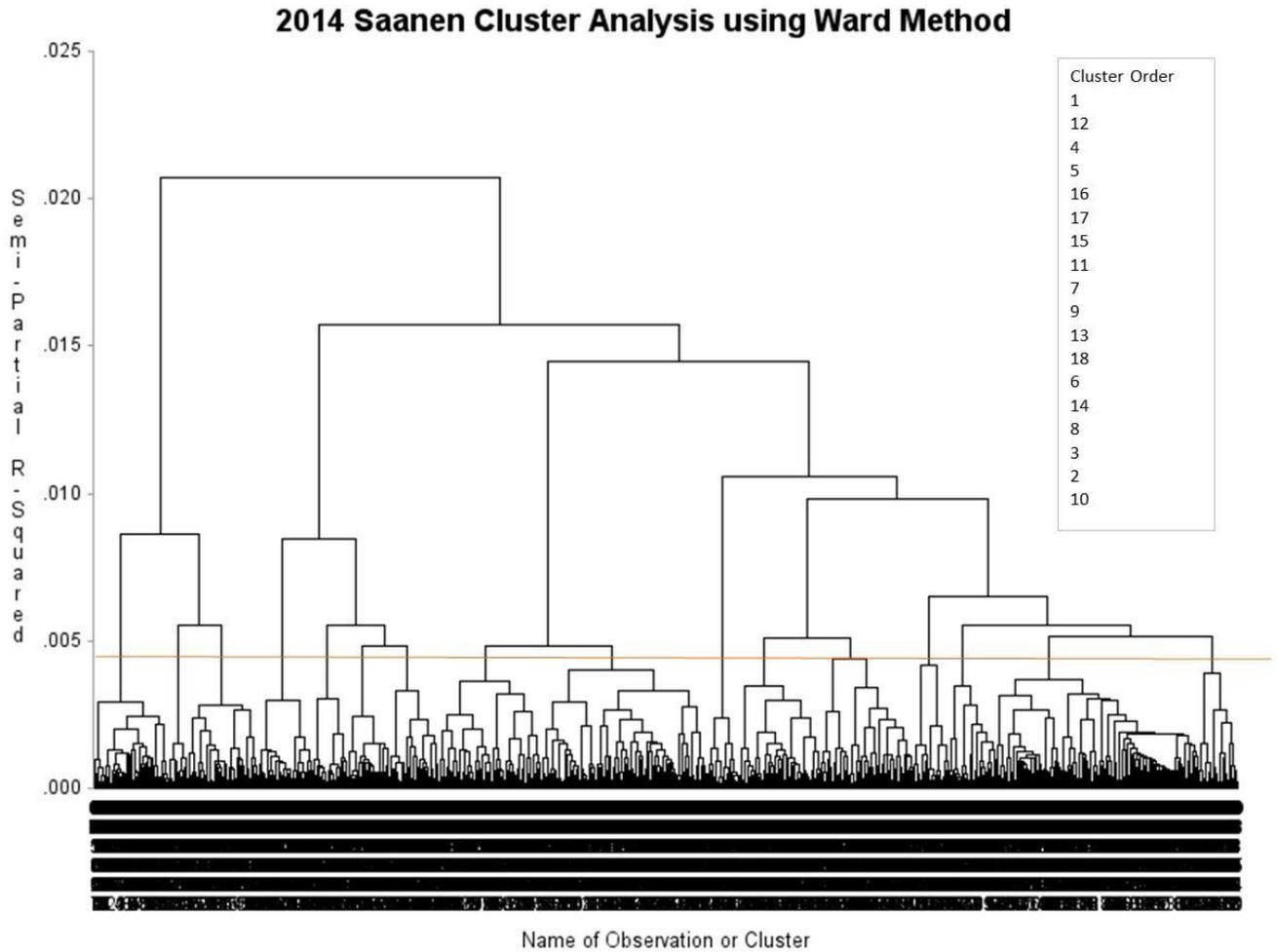
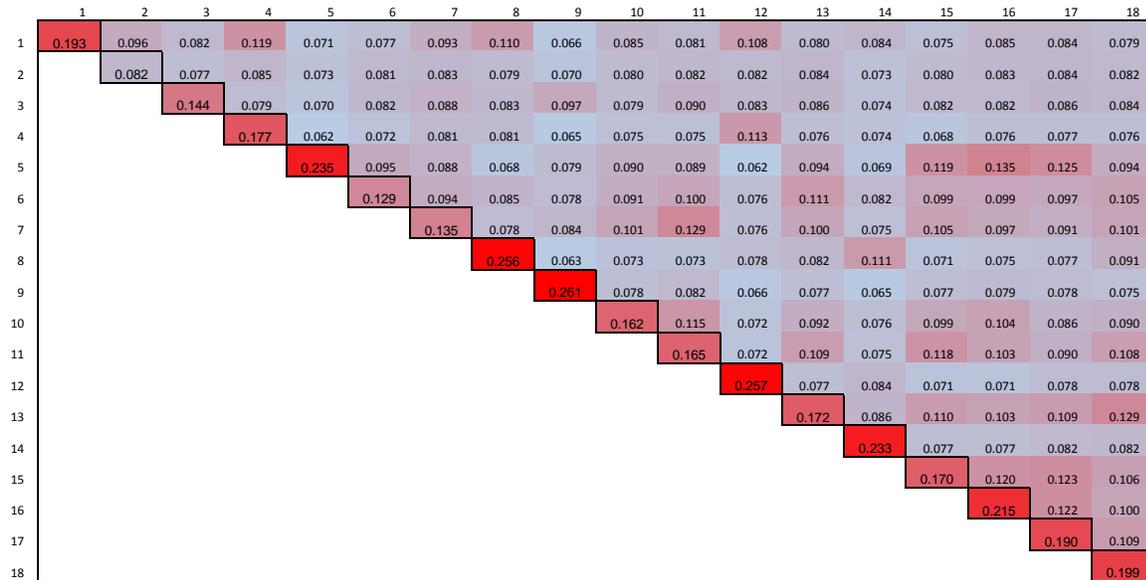


Table 2. Saanen cluster results showing the number, mean, and variance for between and within cluster relationships in addition to repository bucks

Between Clusters				
n	Mean	Variance		
2009	0.093	0.002		
Within Cluster				
	n	Mean	Variance	Bucks in Repository
Cluster 1	133	0.193	0.007	
Cluster 2	355	0.082	0.002	7
Cluster 3	83	0.144	0.009	
Cluster 4	123	0.177	0.006	1
Cluster 5	96	0.235	0.010	
Cluster 6	112	0.129	0.007	
Cluster 7	291	0.135	0.004	
Cluster 8	37	0.256	0.013	
Cluster 9	56	0.261	0.013	
Cluster 10	68	0.162	0.012	
Cluster 11	180	0.165	0.005	
Cluster 12	33	0.257	0.011	
Cluster 13	143	0.172	0.006	
Cluster 14	26	0.233	0.016	
Cluster 15	88	0.170	0.008	
Cluster 16	60	0.215	0.011	
Cluster 17	74	0.190	0.008	
Cluster 18	51	0.199	0.012	

Figure 6 shows the within and between cluster relationship matrix; the heat map suggests the clusters have done a good job of separating closely related animals (red on the diagonal) from more unrelated animals (blue on the off-diagonal).

Figure 6. Within and between cluster relationship matrix for Saanen



Milk, Fat, and Protein PTA are plotted against repository bucks in Figures 7, 8, and 9, respectively. Only three repository bucks have PTA data currently available, but they cover a large range from the breed average.

Figure 7. Saanen genetic trend for Milk PTA compared to repository bucks

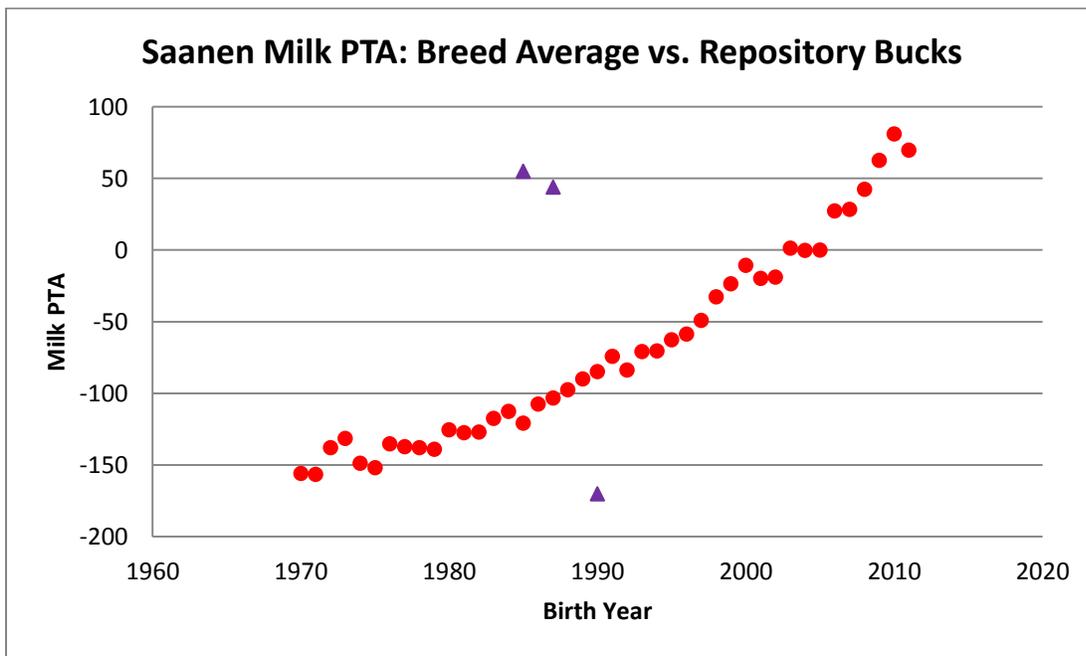


Figure 8. Saanen genetic trend for Fat PTA compared to repository bucks

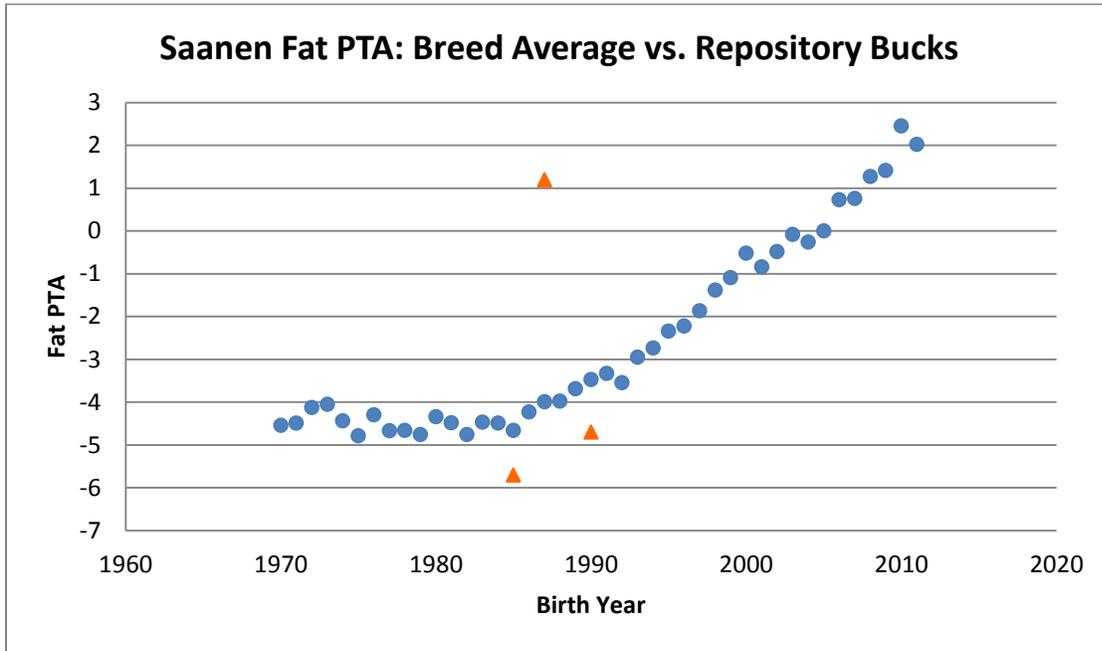


Figure 9. Saanen genetic trend for Protein PTA compared to repository bucks

